

How can I tell if geothermal gases are present?

Some signs of geothermal gases are:

- ◆ A rotten egg smell
- ◆ Visible bubbling in puddles on the ground
- ◆ Unusual rusting patterns (metal fence posts, copper, silver objects)
- ◆ Unexplained headaches, sleepiness, poor concentration only when indoors
- ◆ Unexplained nose and eye irritation, worsening of asthma



Geothermal gases caused the bottom of this fencepost to rust away.



Geothermal gases bubbling in a puddle after rain.

What other areas are affected by geothermal gas venting?

In areas prone to geothermal activity, venting can more readily occur when the ground is penetrated by digging or drilling. This can lead to venting around fence posts, guy wires, and in well heads.

Consider testing soil for geothermal gases prior to commercial or home projects involving excavation of dirt, as explosive levels of methane may be encountered. Special care should be given to avoiding smoking and generation of sparks in and around work areas.

How are geothermal gases identified?

Specialized equipment is needed to take air measurements for most geothermal gases. However, indoor radon testing is simple and inexpensive. Test kits are widely available online.

Who should I contact if I have concerns about geothermal gases ?

Lake County Environmental Health Division
922 Bevins Court
Lakeport, CA 95453
Phone: 707-263-1164

This fact sheet was developed in collaboration with the California Department of Public Health.

Geothermal Gas in Lake County



Answers to Frequently Asked Questions





Clear Lake Volcanic Field

What are geothermal gases?

Much of Lake County is located in the Clear Lake Volcanic Field which explains its productive geothermal power plants and numerous hot springs.

Geothermal gases come from volcanic activity deep within the earth. In affected areas, gases sometimes rise to the earth's surface through small cracks and other openings. The small openings in the ground where gases escape are called "fumaroles" or "vents". Hot springs result from the deep venting of hot water and may also contain gas.

While venting of geothermal gases can happen anywhere in Lake County, it is most commonly recognized in the southern half of the lake and surrounding areas to the south and east. Locations of geothermal gas venting can shift and change over time. Earthquakes and seasonal patterns may contribute to formation of new gas vents.

The gases commonly contain a combination of hydrogen sulfide, methane and carbon dioxide, but they can contain other gases including radon.

Are geothermal gases dangerous to health?

Geothermal gases can be dangerous when found in high concentrations. But they are rapidly diluted to harmless levels in fresh open air. Gases can move through soil and into indoor air through cracks in foundations and utilities. Houses with cement foundations (also called "slab-on-grade") have the greatest risk for gases moving from underground into indoor air. These gases can make people sick if they accumulate in enclosed spaces, buildings or low-lying areas such as in basements or crawl spaces. At high levels they can cause suffocation or sometimes explosion. Children and pets are most sensitive to the effects of geothermal gases. This is because they are closer to the ground where the gases vent.

Hydrogen sulfide (H₂S) found in geothermal gases has a rotten egg smell at extremely low levels. It can aggravate asthma and other lung conditions, and cause irritation of the eyes, nose and skin. At concentrations many thousands of times higher than typically found in open air it can lead to death.

Methane (CH₄) is a colorless odorless gas that does not pose specific health risks, but it is explosive when it accumulates to between 5% and 15% of the air volume. In confined areas, it can also displace oxygen and lead to suffocation.

Carbon dioxide (CO₂) is naturally present at low levels in air, but in higher concentrations it can lead to headache, sleepiness, and unclear thinking. By displacing oxygen, it can lead to death through suffocation.

Radon (Rn) is a naturally occurring radioactive gas that causes lung cancer. It has been measured in some areas in Lake County and homeowners are encouraged to test for it indoors.

What can I do to prevent problems with geothermal gases?

- ⇒ Ventilate crawl spaces under homes. Use open lattice style skirting around mobile homes.
- ⇒ Teach children to stay out of ditches, pipes or other spaces below ground level.
- ⇒ Maintain good fresh-air ventilation in your home.
- ⇒ Don't build underground structures.
- ⇒ Do not allow children or pets to play around areas with bubbling water puddles.
- ⇒ Do not let children play with matches.
- ⇒ Check with local building officials before undertaking excavation work.
- ⇒ Don't smoke or generate sparks in areas where digging is taking place or when accessing underground vaults or other confined spaces.
- ⇒ Check your home with a radon test kit. Radon kits are widely available online. For more information visit: <http://www.epa.gov/radon/radontest.html> or call the California Radon Program at (800) 745-7236.



Mobile home with lattice skirt for ventilation.